

Chapter 3

Theories on Banking Firms: Models based on Industrial Organization Theory

3.2 The Monopolistic Banking Company

In the banking sector, there are significant entry barriers, such as high minimum capital requirements, the need for authorization by supervisors, and the requirement that management bodies be composed of suitable individuals, among others. Furthermore, banks establish long-term, stable relationships with their customers, granting them a certain degree of market power in setting interest rates, a reality further exacerbated by their critical role in collecting and processing information to address information asymmetries. Analyzing a bank as a monopolist is akin to analyzing the banking sector as a whole.

Economic theory has studied the banking sector in monopoly and oligopoly environments for decades. This literature is rooted in the works of Klein (1971) and Monti (1972), whose model is known as the Monti-Klein model. While the original model analyzes the bank as a monopolist, it has since been adapted to consider oligopolistic scenarios.

Let's first go through the assumptions of the monopolist version of the Monti-Klein model. Under monopoly, the bank represents the entire banking industry and faces the aggregate supply of deposits and the aggregate demand for credit from the non-banking sector, both of which depend on their respective interest rates:

$$\begin{cases} L = L(r_L) & \text{with } L'_{r_L} < 0 \\ D = D(r_D) & \text{with } D'_{r_D} > 0 \end{cases}$$

It is more convenient to work with the inverse functions of loan demand and deposit supply:

$$\begin{cases} r_L = r_L(L) \text{ with } r'_L < 0 \\ r_D = r_D(D) \text{ with } r'_D > 0 \end{cases}$$

The bank decides on the volume of deposits and loans and determines the respective interest rates.

By assumption, the bank remains a price-taker in the international money market. The operational cost function, $C(D, L)$, remains unchanged from the previous case.

The monopolist bank's objective function is:

$$\max \pi = r_L(L)L + r_T[D(1 - k) - L] - r_D(D)D - C(D, L).$$

To maximize profit, the bank solves the following first-order conditions:

$$\begin{cases} \frac{\partial \pi}{\partial L} = 0 \\ \frac{\partial \pi}{\partial D} = 0 \end{cases} \iff \begin{cases} r'_L L + r_L - r_T - C'_L = 0 \\ r_T(1 - k) - r_D - r'_D D - C'_D = 0 \end{cases}$$

We will now introduce the concepts of loan elasticity with respect to its interest rate and deposit elasticity with respect to its interest rate.

The elasticity of loans (e_L) is:

$$e_L = -\frac{\frac{\partial L}{\partial r_L}}{\frac{L}{r_L}} = -\frac{\partial L}{\partial r_L} \frac{r_L}{L} = -L'_{r_L} \frac{r_L}{L} > 0$$

Note 2: Since $\frac{\partial L}{\partial r_L} < 0$, in this elasticity we introduce, by convention, a negative sign to ensure that the elasticity is always positive.

We can verify that:

$$e_L = -L'_{r_L} \frac{r_L}{L} = -\frac{1}{r'_L} \frac{r_L}{L} \Rightarrow r'_L L = -\frac{r_L}{e_L}$$

The elasticity of deposits (e_D) is:

$$e_D = \frac{\frac{\partial D}{\partial r_D}}{\frac{r_D}{D}} = \frac{\partial D}{\partial r_D} \frac{r_D}{D} = D'_{r_D} \frac{r_D}{D} > 0$$

and, therefore,

$$e_D = D'_{r_D} \frac{r_D}{D} = \frac{1}{r'_D} \frac{r_D}{D} \Rightarrow r'_D D = \frac{r_D}{e_D}$$

Going back to the partial derivatives of the profit maximization equation, we can rewrite them using the elasticity concepts:

$$\begin{cases} \frac{\partial \pi}{\partial L} = 0 \\ \frac{\partial \pi}{\partial D} = 0 \end{cases} \Leftrightarrow \begin{cases} -\frac{r_L}{e_L} + r_L - r_T - C'_L = 0 \\ r_T(1-k) - r_D - \frac{r_D}{e_D} - C'_D = 0 \end{cases} \Leftrightarrow \begin{cases} r_L - r_T - C'_L = \frac{r_L}{e_L} \\ r_T(1-k) - r_D - C'_D = \frac{r_D}{e_D} \end{cases} \Leftrightarrow \begin{cases} \frac{r_L - (r_T + C'_L)}{r_L} = \frac{1}{e_L} \\ \frac{r_T(1-k) - (r_D + C'_D)}{r_D} = \frac{1}{e_D} \end{cases}$$

These two profit maximization conditions can be interpreted similarly to the profit maximization condition of a monopolist firm that produces only one product.

For the general case of a monopolist producing a single product:

$$\frac{P - MC}{P} = \frac{1}{e}$$

This is the **Lerner Index**. The profit maximization condition means that the monopolist firm charges a markup, and this markup depends on the elasticity of the demand it faces, i.e., it depends on its market power. If the

elasticity is low, the monopolist can charge a higher price, thus obtaining a larger margin; in this case, its market power is high.

In our model, we have two products (deposits and loans), with the markup of each depending on the bank's market power in its respective market (loan market and deposit market), which increases as elasticity decreases.

The first of the two profit maximization conditions can be interpreted as the interest rate margin on loans: the interest rate on loans is set by the bank above the marginal cost of loans. Note that to produce one additional unit of loans, the bank must incur the cost of funds in the interbank market r_T , as well as the operational marginal cost C'_L .

The second condition is interpreted similarly, with the difference that deposits involve costs (rather than revenues). The monopolist sets the interest rate on deposits to obtain a positive margin between what it earns in the money market with each additional unit of deposits $r_T(1 - k)$ and what this unit costs ($r_D + C'_D$).

Both margins depend on the respective elasticity values. Thus, the bank's intermediation margin will be negatively affected if financial products that are substitutes for the bank's products appear in the market.

References

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